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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/060,957	01/29/2002	Thomas R. Ulrich	BSTOR.038A	7927

20995 7590 09/09/2004

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EXAMINER

VITAL, PIERRE M

ART UNIT	PAPER NUMBER
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2188

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/060,957

Applicant(s)

ULRICH ET AL.

Examiner

Pierre M. Vital

Art Unit

2188

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7-9</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office Action is in response to Application No. 10/060,957 filed January 29, 2002. Claims 1-14 are pending in this application.
2. The specification and the claims have been examined with the results that follow.

Information Disclosure Statement

3. The information disclosure statement filed December 17, 2002; February 28, 2003 and April 29, 2003 complies with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

4. Figure 21 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-5 and 7-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Stallmo et al (US5,657,468).

As per claim 1, Stallmo discloses a dynamically scalable storage system, comprising: a first plurality of disk drives for storing distributed parity groups, each distributed parity group comprising storage blocks, said storage blocks comprising one or more data blocks and a parity block, each of said storage blocks stored on a separate disk drive such that no two storage blocks from a given distributed parity group reside on the same disk drive [*parity data is exclusive OR of all data on disks 802-808; col. 11, lines 31-48; RAID 5 configuration uses parity to eliminate the bottleneck of storing parity on a single drive; col. 3, lines 10-13*]; file system metadata to describe a location of each of said storage blocks by specifying a disk identifier and a logical block identifier of a first logical block of each storage block [*SCSI id and LUN supported by the disk; col. 11, lines 56-60; operations of blocks 1212 through 1222 are done relative to block position pointer; col. 13, lines 55-65*]; a processor configured to manage said file system metadata, said processor configured to recognize when a new disk drive is added to said first plurality of disk drives to produce a second plurality of disk drives, said processor further configured to cause one or more existing storage blocks from said first plurality of disk drives to be

Art Unit: 2188

moved to said new disk drive to balance usage of all drives in said second plurality of disk drives, said processor further configured to update said file system metadata to point to storage blocks moved to said new disk drive [*In transparent RAID, when disk is added, re-striping starts automatically*; col. 9, lines 39-52; *In transparent RAID, this supports load balancing of unprotected data*; col.10, lines 42-59].

As per claim 2, Stallmo discloses said processor further configured to allocate space for at least a portion of newly created distributed parity groups on said new drive [*data is re-striped across all the disks including the new disk*; col. 9, lines 41-45].

As per claim 3, Stallmo discloses said processor further configured to use any free logical blocks on said new disk drive to store one or more storage blocks [*space on the disk is available for all operations*; col. 9, lines 46-48].

As per claim 4, Stallmo discloses said new disk drive is larger in capacity than any drive in said first plurality of disk drives [*disks of varying sizes can be managed*; col. 6, lines 23-26].

As per claim 5, Stallmo discloses a size of a first distributed parity group is larger than a size of a second distributed parity group within a first file [*disks of varying sizes can be managed*; col. 6, lines 23-26].

As per claim 7, Stallmo discloses a file is organized as one or more distributed parity groups of varying size [*the number of disks have varying sizes*; col. 8, lines 26-40].

As per claim 8, Stallmo discloses a file is organized as one or more distributed parity groups having different extents [*disks have varying number of data blocks*; col. 8, lines 23-26].

As per claim 9, Stallmo discloses an extent of a first distributed parity group of a file is larger than an extent of a second distributed parity group of said file [*disks have varying number of data blocks, thus extent on disk 1 will be larger than on disk 2*; col. 8, lines 23-40].

As per claim 10, Stallmo discloses a method for managing a storage array, comprising: recognizing a new storage device [*new disk is added to the set*; col. 15, lines 40-55]; adding said new storage device to a list of previously-available storage devices to produce a list of currently-available storage devices [*including the new disk in the configuration*; col. 15, lines 62-63]; determining a size of a new parity group, said size describing a number of data blocks in said new parity group [*read depth's worth of blocks from parity disk*; Fig. 12; step 1216]; computing a parity block for said parity group [*create parity data*; Fig. 11; step 1112]; storing one of said data blocks of said parity group on said new storage device [*data is re-striped across all the disks including the new disk*; col. 9, lines 41-45]; combining a first distributed parity group with a second distributed parity group to produce at least one new parity group [*combine parity*; Fig. 11, step 1120]; and storing one data block of said at least one parity group on said new storage device [*data is re-striped across all the disks including the new disk*; col. 9, lines 41-45].

As per claim 11, Stallmo discloses storing metadata to describe a disk and logical block location of each of said data blocks and said parity block [*SCSI id and LUN supported by the disk*; col. 11, lines 56-60].

As per claim 12, Stallmo discloses said new storage device comprises a new disk drive [*adding a new disk*; col. 9, lines 42-51].

As per claim 13, Stallmo discloses said new disk drive is larger in capacity than other disk drives in said list of previously-available storage devices, and wherein said one data block of said at least one parity group can be stored on any unused logical block of said new disk drive [*disks of varying sizes can be managed*; col. 6, lines 23-26; *space on the disk is available for all operations*; col. 9, lines 46-48].

As per claim 14, Stallmo discloses recognizing that a selected storage device has gone offline, removing said selected storage device from said list of currently-available storage devices to produce a list of remaining storage devices [col. 12, lines 11-14; col. 16, lines 37-38]; reconstructing data stored on said selected storage device [col. 16, lines 33-40]; storing said reconstructed data on one or more of said remaining storage devices [col. 16, lines 40-41]; and updating file system metadata to facilitate locating said reconstructed data [col. 16, lines 41-53].

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stallmo et al (US5,657,468) and Chin et al (US6,000,020).

As per claim 6, Stallmo discloses the claimed invention as detailed per claim 1 above in the previous paragraphs. However, Stallmo does not specifically teach said new disk drive is provided to a Fibre Channel network as recited in the claim.

Chin discloses the use of a Fibre Channel network with disk drives to provide high data availability and increased processing performance (col. 4, lines 17-50). Since the technology for implementing a Fibre channel network was well known as evidenced by Chin and since a Fibre Channel network provides high data availability and increased processing performance, an artisan would have been motivated to use a Fibre Channel network in the system of Stallmo. Thus, It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the system of Stallmo to include a Fibre Channel network because it was well known to provide high data availability and increased processing performance as taught by Chin.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is required under 37 C.F.R. § 1.111 (c) to consider these references fully when responding to this action. The documents cited therein teach adding new drive to a plurality of disk drives, Fibre channel network, computing parity data and distributing parity to available drives.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pierre M. Vital whose telephone number is (703) 306-5839. The examiner can normally be reached on Mon-Fri, 8:30 am - 6:00 pm, alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (703) 306-2903. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2188

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 6, 2004

Pierre M. Vital
Pierre M. Vital
Examiner
Art Unit 2188